

# Gastrointestinal disturbances in marathon runners

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To determine the prevalence of various gastrointestinal disturbances related to long-distance running and its effect on weight, diet and everyday digestive problems, we gave a questionnaire to 279 leisure-time marathon runners, comprising 10% of the participants in a local marathon race. Their answers disclosed a prevalence of dietary changes, weight reduction and altered bowel habits (mainly looser stools and/or more frequent defaecation) of 37, 38 and 48% respectively. A quarter reported earlier long lasting gastrointestinal problems, which improved in 41% of the runners after they started regular training. Thirty-four percent experienced gastrointestinal disturbances during or after running, 20% to such an extent that it seriously affected their performance.

**Key words:** Marathon runners, gastrointestinal disturbances, dietary changes, weight reduction, intestinal ischemia

## Introduction

Gastrointestinal problems in marathon runners have received increasing attention in recent years. While some reports have focused on occult<sup>1-3</sup> or sometimes overt<sup>4-6</sup> intestinal bleeding, others<sup>7-9</sup> have dealt with various gastrointestinal symptoms-abdominal pain, bloating and diarrhoea being the most frequent. In an earlier study, dedicated mainly to occult gastrointestinal blood loss in marathon runners<sup>10</sup>, we also observed a high frequency of various digestive symptoms during both training and competition. The aim of the present study was to determine the prevalence of different gastrointestinal complaints in a population of relatively well trained leisure-time runners. We also wanted to study how long-term regular training might affect weight, dietary and bowel habits and earlier functional gastrointestinal problems.

## Material and methods

We studied 279 of the runners in the Drammen Marathon 1985; about 10% of participants. There were 227 males, and 52 females. Their mean age was 39 years (range 17 to 65 years). They completed a questionnaire on age, occupation, training background (years of regular training and weekly running hours), distance (half marathon or the full distance), possible changes in diet, weight, bowel habits, earlier

gastrointestinal complaints and digestive disturbances during or after running. The different occupations were classified in three groups – physically light, medium and hard work.

The influence of age, sex, occupation, diet, years of training and weekly training hours were evaluated. The statistical significance of differences in results between various groups was determined using the chi-squared test. When not stated otherwise, a p-value of less than 0.05 was found. Differences not reaching statistical significance at this level, are denoted NS – not significant.

## Results

### Finishing times

The mean finishing times for the men were 3 h 29 min 55 s for the full marathon distance and 1 h 34 min 22 s for the half marathon respectively. The corresponding results for the women were 3 h 39 min 59 s and 1 h 45 min 35 s.

### Training background

The training load is set out in Table 1; males on average trained somewhat more than females.

### Dietary changes

Thirty-seven percent reported changes in dietary habits after they had started regular long-distance running. The consumption of vegetables, various cereals and fibre products, and to some extent also fish, increased, whereas the intake of fat, sugar, meat and calories decreased. The prevalence of altered dietary habits were positively correlated to both years of training and weekly running hours. There were no sex differences.

### Weight changes

Weight reduction was found in 41% of the male and 25% of the female runners (38% of all participants)

Table 1. Training background

Years of training	%	Weekly training load	%
<1 year	12	<5 hours	63
1-5 years	38	5-10 hours	34
>5 years	50	>10 hours	3

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but increased weight was seen in 4 and 11% of men and women, respectively. The groups with weight gain and reduction both tended towards the mean i.e. regular training 'normalized' the weight. The weight changes were not influenced by either years of training or weekly running hours. Runners with physically less demanding jobs had more frequent weight reductions than the others (NS). More marked was the influence of an altered diet. Runners with and without dietary alterations had a prevalence of weight reduction of 48 and 31% respectively.

### Changes in bowel habits

About half the runners experienced changes in bowel habit usually of more frequent and/or watery stools (Table 2). Alterations were far more prevalent among women than men and were also correlated to dietary changes. The runners who altered their diet as described above, had a prevalence of more frequent and watery stools of 52 and 43%, respectively, while the comparable figures for those without dietary changes were 30% for both. Again, years of running or weekly training loads did not affect the results. The runners with earlier gastrointestinal complaints had the highest prevalence of altered bowel habits after they started training.

### Improvement in earlier digestive problems

A quarter of the athletes had a history of earlier gastrointestinal complaints, most often abdominal pain and somewhat less frequently, gas problems and diarrhoea. A minority had an organic gastrointestinal disease, like duodenal ulcer and inflammatory bowel disease. Forty-one percent experienced improvement in their digestive problems after they started long-distance running. Changes in diet again seemed to be an important factor. Improvement was reported by 62% of the runners who changed their diet, compared to 28% of those who did not. In the group with physically light work, 48% improved, while only 22% of those with more strenuous jobs did so. Weekly training loads did not affect these results.

### Gastrointestinal disturbances related to running

Gastrointestinal problems during or after running were reported by 34% of all participants (30% of males, 54% of females). Twenty percent had such serious problems that it clearly interfered with their performance (16% males, 37% of females).

In Table 3 the most prevalent complaints are listed. Neither weekly training load nor dietary changes

affected the results. A history of earlier everyday digestive problems was associated with a markedly increased frequency of running-related gut disturbances. However, looking at the subgroup whose digestive problems had improved after they started training, we found the same prevalence of gastrointestinal problems related to running as in the total sample.

### Results related to running speed

The prevalence of gastrointestinal disturbances related to running was markedly higher in the faster athletes (i.e. better finishing time than the mean). The faster half of the runners had a prevalence of running-related digestive problems of 41%, compared with 28% for the slower half. Also with regard to the more serious problems, having a clearly detrimental effect on performance, there was a tendency (NS) in the same direction. At the same time, the faster group reported more frequent improvement in earlier digestive complaints (47 versus 33%, NS). The prevalence of weight reductions, dietary changes, earlier gastrointestinal complaints and changes in bowel habits were not influenced by running speed.

### Effect of age

None of the results reported above were dependent on the runner's age.

### Discussion

In accordance with earlier works<sup>7-10</sup> we have found a high prevalence of various gastrointestinal problems among marathon runners, both related to running and in everyday life. The frequency of everyday digestive complaints is comparable to what have been found in other populations<sup>11-12</sup>. It is noteworthy that over 40% reported improvement of their gut problems after beginning regular training. As a diagnosis of organic gastrointestinal disease had been made in only a minority of the runners, most of these disturbances must be assumed to be of a functional nature. Regular running training thus seems to have a considerable therapeutic potential for functional gut disorders and may well be worth considering when advising patients with, for instance, the irritable bowel syndrome.

Dietary alterations seemed to be an important factor for weight reduction, changes in bowel habit and improvement in everyday digestive problems,

Table 2. Changes in bowel habits (%)

	Men	Women	Total
More frequent defaecation	34	54	38
More watery stools	32	50	36
Either or both	44	62	48

Table 3. Various gastrointestinal complaints during/after running (%)

	During	After
Abdominal pain	19	3
Gas problems	16	1
Diarrhoea	15	6
Nausea/vomiting	6	5
Overt blood in the stools	0	3

but did not affect the prevalence of running-related gut problems. While weekly training load or years of training did not affect the results (other than in the frequency of dietary changes), running speed was a factor in the prevalence of running-related digestive problems. Others have found that gastrointestinal complaints are more prevalent among the younger and fastest runners<sup>7</sup>. Maybe this difference is more related to performance than to age. We could not find any age-related differences in the results, but this may partly be because our sample mainly consists of leisure-time runners, excluding the fastest and most competitive ones. On the other hand, judging from the mean finishing times, the runners seemed to be rather ambitious, and the failure to detect any influence of training background on the results might suggest that most participants had a training programme harder than necessary to achieve an effect.

The fact that the greatest benefit with regard to weight reduction and improvement in earlier gastrointestinal complaints was gained by those who had the lowest physical activity level at work, is not surprising, but has to our knowledge not been demonstrated before.

Like the other studies in this field, this study includes mostly men. The overall results thus apply mainly to male runners, as there are marked sex differences. The frequency of both altered bowel habits and gut problems during running were very much higher in women, as found by others<sup>7,8</sup>. The reason for these differences is unknown, but possibly endocrine factors are of some importance. There have been several reports about various endocrine effects of physical exercise<sup>13-15</sup>, but theories concerning this are speculative.

Common theories about causal mechanisms of bowel disturbances are ischaemia and mechanical trauma. The less frequent occurrence of these symptoms among bicyclists and cross-country skiers after physical performances comparable to marathon running (but with presumably less shaking of the intra-abdominal contents) may support the latter, although reports show a considerable prevalence of both abdominal pain, diarrhoea and occult gastrointestinal bleeding after cross-country skiing<sup>16</sup>.

Several investigators have shown (in later years mainly with the help of transcutaneous Doppler-ultrasound equipment) major reductions in mesenteric blood flow during and, in some cases, more than an hour after exercise<sup>1,16,17</sup>. In one report, the occurrence of gastrointestinal symptoms were positively correlated to more severe reductions in mesenteric blood flow<sup>16</sup>. Gastroscopy and colonoscopy performed on runners with haematemesis and/or melaena after exercise have shown lesions with a histological picture typical for ischaemic mucosal damage<sup>4-6</sup>. Exercise-induced mesenteric ischaemia is commonly regarded as more prevalent in unfit runners, but some have been unable to demonstrate any correlation to training state<sup>17</sup>.

To what extent running or other forms of exercise influences various gastrointestinal functions other than blood flow is only partly known. Sullivan has reviewed this field<sup>13</sup>. The effect of physical exercise

seems to be dependent upon intensity. While slow running may hasten gastric emptying, more strenuous exercise will slow it. The same probably applies to acid secretion. Several investigators have found an increased frequency of defaecation and some also a reduced bowel transit time in runners<sup>18</sup>. Harrison suggests that running may tend to normalize gut transit time, speeding the slow and slowing the fast<sup>19</sup>.

In conclusion, while causal mechanisms are still largely unknown, we have found a high prevalence of gastrointestinal disturbances related to exercise in marathon runners. At the same time, a considerable proportion of the runners experienced improvement in earlier digestive problems after they started training. The therapeutic effect of regular running or other forms of physical exercise in patients with functional gut disorders is worth further investigation.

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